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there has been no diminution in the number of the Indians of the North American continent since the first settlement. The author took the ground that the works which are supposed to have taken great numbers to accomplish them were rather the results of long-continued labor. This statement in opposition to the almost unanimous opinion of writers on our Indians was the subject of considerable attention. Professor Marsh in his address before the section of biology took occasion to say that while the primates originated on the American continent, the absence of higher fossil forms argues their subsequent migration, and consequently the impossibility of man's having originated in our hemisphere.

The Davenport (Iowa) Academy of Natural Science has issued volume ii. part i. of its Proceedings. Among the valuable contributions to archæology, the one which will attract the most attention is the description, by the Rev. J. Gass, of his discovering in a mound tablets of soft shale, having elaborate inscriptions scratched on them. One represents a hunting party, another a cremation scene, and a third is a supposed calendar.

In addition to the antiquities already mentioned from Porto Ricó and described in the Smithsonian Report for 1876, Professor Baird has just received from Mr. Lewis Jones R. Brace, of Nassau, N. P., drawings of celts, images, and stools, differing from those already described only in detail. Among the specimens are two wooden stools, one of which is the long-tailed variety sent by Messrs. Gabb and Frith. The other is a short-tailed variety, and resembles very much a shallow dish. I have seen similarly shaped, so-called mortars or metates from Central America, made to resemble a quadruped, the head projecting in front and the tail twisted around for a handle.

The Smithsonian Annual Report for 1876, just published, is in some respects the most interesting number ever issued.

Dr. Paul Broca, the distinguished anthropologist, presided over the French Association this year. In his opening address he gave a *résumé* of the fossil races of Western Europe, dividing them as follows:—

1. Caustadt Race, the oldest (dolicocephalic).
2. Cromagnon Race (").
3. Furfooz Race (brachycephalic).

Authors of anthropological treatises and papers, desiring to have them noticed in Baird's Annual Record, will please send copies to Professor S. F. Baird or to O. T. Mason, Washington, D. C. — O. T. MASON.

GEOLOGY AND PALÆONTOLOGY.

DISCOVERY OF JOINTED LIMBS IN TRILOBITES.—In a paper entitled Notes on Some Sections of Trilobites from the Trenton Limestone, published in advance of the report of the New York State Museum of Natural History, Mr. C. D. Walcott describes and figures jointed limbs in

Calymene and Ceraurus. It will be remembered that the nature of the limbs of trilobites has been long a matter of controversy, some believing they had soft, membranous limbs, and others that they had jointed limbs, like those of the king crab (*Limulus*) and the fossil *Eurypterus*, etc., and still others that they may have had anterior ambulatory jointed limbs, and posterior broad membranous swimming abdominal appendages. Mr. Walcott, after making many sections of trilobites, has discovered jointed appendages in them, numerous sections of *Calymene senaria* showing axial appendages with three joints; "the third joint in all appendages of this species seen (seventy-seven in number) terminates in a round, blunt end." In *Ceraurus pleurexanthemus* the limb is five jointed. The legs end in a single blunt end, and Mr. Walcott is inclined to think the legs will be found to have "five or six joints with a terminal claw."

"Attached to the basal (?) joint of the leg there is a slender-jointed arm of two, and probably three joints. Portions of pinnulæ are attached to the terminal joint. Whether they are branchial tubes cannot be satisfactorily determined from the section. In other sections rows of pinnulæ are shown which are undoubtedly branchial tubes. From the character of the remaining portion of the respiratory apparatus they must have been attached to the arm. It is also quite probable that a branchia was attached to the basal joint of the arm. It may be that its occurrence in this position in the section, is owing to a displacement of one of the branchiæ attached to the side of the thoracic cavity. These branchiæ are attached above the basal joint of the leg. The branchia in *Calymene senaria* projects out a short distance and then bifurcates, sending two spirals nearly to the edge of the dorsal shell. In some sections the base appears to be a portion of the ribbon or band forming the spiral straightened out, while in others it is a closely coiled spiral. At the bifurcation the outer spiral springs from the base which continues on to form the inner spiral."

A transverse section of the head of *Calymene* cut so as to cross the hypostoma just within the posterior end, exhibited a space filled with calc-spar, which "is the continuation of the visceral cavity of the thorax." From the lower lateral margin of each side a jointed appendage extends outward and downward. "Between the upper pair of appendages and the glabella three pairs of appendages project. Their basal joint is slender, and, in two sections, closely resembles the maxillary joint of the leg of the *Eurypterus*, modified in form, but undoubtedly subservient to the same use as a part of the mouth." Sections of *Asaphus platycephalus* furnish evidence that it had axial appendages of essentially the same structure as those of *Calymene* and *Ceraurus*.

Mr. Walcott concludes that the homology between the parts about the mouth of the trilobite and the same organs in the *Eurypterida* and *Xiphosura* is very direct and relates the families closely, and he considers that the *Xiphosura*, *Eurypterida*, and *Trilobita* form the legion Me-

rostomata and subclass Gnathopoda. Having ourselves, from a study of the king crab and the tegument of the trilobites, and from the suggestions of Billings regarding the nature of the appendages of the trilobites, arrived at the conclusion that the trilobites most probably had jointed ambulatory limbs as well as membranous swimming appendages, it is gratifying to find what was before a matter of probability, actually demonstrated by the patient toil and well sustained energy of Mr. Walcott.

The discovery of the nature of the limbs of trilobites "adds a fresh laurel," to use a fossilized expression, to American palæontology.

THE GREENLAND GLACIERS. — Amund Helland, of Christiania, Norway, made in 1875 a journey to North Greenland, and gives in the *Quarterly Journal of the Geological Society of London* (No. 129), the results of his comparisons of the glacial phenomena of that country with those of Norway. He has overlooked the writings of Americans who have visited Greenland, and he probably never saw the magnificent work in folio of our marine artist, William Bradford of New York, which contains many photographs of the Greenland glaciers, and possesses a good deal of scientific value. Helland believes that "the thickness of the inland ice near its border cannot exceed 250 metres, and is probably not more or is even less than 200 metres; but since its surface rises as we proceed inland, its thickness may possibly increase in that direction."

"The amount of precipitation in North Greenland seems to indicate indirectly the great extent of the inland ice; for where the glaciers are largest it is not considerable; at the colony of Jakobshavn the rainfall from July, 1873, to July, 1874, was 219.7 mm., from July, 1874, to July, 1875, 183.7 mm. In the district of Umanak, where there are a number of great ice-fjords, the rainfall seems to be no greater; yet here the glaciers are very large, one may say the largest known; so that we can only account for them by supposing that they are supplied from a very extensive upland district on which there is a considerable snow fall, and thus that there can be little land in the interior free from ice. Be this as it may, there is no doubt that the ice-sheet extends into Greenland beyond the range of vision."

The fact, he says, that though the climate of Greenland is rather dry large glaciers are numerous, is not without geological importance, as showing that a great snow fall is not absolutely necessary for the glaciation of an extensive country. "It is also remarkable that the glaciers are supplied from an ice-field which, to a large extent at least, lies below the limit of perpetual snow." He contends that Greenland is not a collection of islands, but a fjord land like Norway or the coast of North America.

He found that the Jakobshavn glacier flows with a velocity greater than any that has hitherto been observed, the greatest daily motion observed being 22.46 metres, from July 8th, seven P. M., to July 9th, ten A. M., while the slope of the land is only half a degree. The maximum daily

motion as observed by Professor Tyndall on the Mer de Glace (Chamouni) was $33\frac{3}{4}$ inches (0.85 metre) in June.

“The rate of flow, already mentioned, has an important bearing on the theory of glacier-motion. As the slope of the Jakobshavn glacier, which has the extraordinarily rapid motion of twenty metres *per diem*, is only half a degree, the fall of the bed of the valley cannot be the most important factor in the motion of glaciers. This considerable velocity must be due to the quantity of ice which has to be carried out to the fjord; or, in other words, the rate of motion is dependent on the pressure of the mass of the inland ice. Glaciers, therefore, fed from large districts of atmospheric precipitation, move with considerable velocity.”

Helland thinks it doubtful if the ice-sheet and the glaciers would form again could the land be denuded of them and left to the influences of the present climate.

The author also discusses in an interesting way the formation of cirques and lake basins in Norway and Greenland, but the views of Ramsay and others which he supports are becoming antiquated.

GEOGRAPHY AND EXPLORATION.

STANLEY'S JOURNEY ACROSS AFRICA. — Following the journey of Cameron across the continent of Africa from coast to coast, we have the adventurous march of Stanley, who arrived at Loanda, on the west coast, August 21st. From a *résumé* in the *Nation* we learn that he began his journey in November, 1874, at Bagamoyo, on the east coast. He was a year and a half reaching Ujiji, but meanwhile had surveyed the Victoria Nyanza, had crossed the intervening divide to the Albert Nyanza, and had explored the Alexandra Nile. He next, after visiting Lake Tanganyika, followed up the Lukuga, which Cameron had considered a genuine outlet to the lake, but which Stanley claimed was only such in exceptionally high water. In November, 1876, he set out through Uregga, crossed the left bank of the Lualaba, and passed around a series of cataracts, situated just north and south of the equator. “At 2° N. latitude the northerly course of the river bends to the northwest, then to the west, and finally to southwest, where its width is from two to ten miles, and the stream is choked with islands.” This river was called Congo by the natives. On the 8th of August, 1877, Stanley arrived at Boma, at the head of the Congo delta; on the 14th, at Cabinda, on the coast; and on the 21st at S. Paulo de Loanda. “His party (114 in number) was greatly reduced by dysentery, scurvy, and ulcers, and his last white comrade, Francis Pocock, had perished by being carried over one of the cataracts. His faithful body-servant, Kalulu, was also among the missing. The importance of Stanley's discoveries, in a geographical point of view, cannot be overestimated. They take rank among the foremost of the century, and are destined to give a new impulse and direction to exploration in Central Africa. Hitherto geographers had not conjectured that